2

The Development of Perception and Attention

The linkage between tool use and speech affects several psychological functions, in particular perception, sensory-motor operations, and attention, each of which is part of a dynamic system of behavior. Experimental-developmental research indicates that the connections and relations among functions constitute systems that change as radically in the course of a child's development as do the individual functions themselves. Considering each function in turn, I will examine how speech introduces qualitative changes in both its form and its relation to other functions.

Köhler's work emphasized the importance of the structure of the visual field in organizing the ape's practical behavior. The entire process of problem solving is essentially determined by perception. In this respect Köhler had ample grounds for believing that these animals are bound by their sensory field to a much greater extent than adult humans. They are incapable of modifying their sensory field by means of voluntary effort. Indeed, it would probably be useful to view as a general law the dependence of all natural forms of perception on the structure of the sensory field.

However, a child's perception, because it is *human,* does not develop as a direct continuation and further perfection of the forms of animal perception, not even of those animals that stand nearest to humankind. Experiments conducted to clarify this problem led us to discover some basic laws that characterize the higher human forms of perception.

The first set of experiments concerned developmental stages of picture perception in children. Similar experiments describing specific aspects of young children's perception and its dependence on higher

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

psychological mechanisms had been carried out earlier by Binet and analyzed in detail by Stern.[1] Both authors found that the way small children describe pictures differs at successive developmental stages. A two-year-old usually limits his description to separate objects within the picture. Older children describe actions and indicate the complex relations among the separate objects within the picture. Stern inferred from these observations that a stage when children perceive separate objects precedes the stage when they perceive actions and relations in addition to objects, that is, when they perceive the picture as a whole. However, many psychological observations suggest that the child's perceptual processes are initially fused and only later become more differentiated.

We resolved the contradiction between these two positions through an experiment replicating Stern's study of children's descriptions of pictures, in which we asked children to communicate the contents of a picture without using speech. We suggested that the description be made *in pantomime*. The two-year-old child, who according to Stern's schema is still at the separate "object" stage of development, perceived the dynamic features of the picture and reproduced them with ease through pantomime. What Stern regarded as a characteristic of the child's perceptual skills proved to be a product of the limitations of her *language development* or, in other words, a feature of her *verbalized perception.*

A series of related observations revealed that labeling is the primary function of speech used by young children. Labeling enables the child to choose a specific object, to single it out from the entire situation he is perceiving. Simultaneously, however, the child embellishes his first words with very expressive gestures, which compensate for his difficulties in communicating meaningfully through language. By means of words children single out separate elements, thereby overcoming the natural structure of the sensory field and forming new (artifically introduced and dynamic) structural centers. The child begins to perceive the world not only through his eyes but also through his speech. As a result, the immediacy of "natural" perception is supplanted by a complex mediated process; as such, speech becomes an essential part of the child's cognitive development.

Later, the intellectual mechanisms related to speech acquire a new function; verbalized perception in the child is no longer limited to labeling. At this next stage of development, speech acquires a synthesizing function, which in turn is instrumental in achieving more complex forms of cognitive perception. These changes give human perception an

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

entirely new character, quite distinct from the analogous processes in higher animals.

The role of language in perception is striking because of the opposing tendencies implicit in the nature of visual perception and language. The independent elements in a visual field are simultaneously perceived; in this sense, *visual perception is integral.* Speech, on the other hand, requires sequential processing. Each element is separately labeled and then connected in a sentence structure, *making speech essentially analytical.*

Our research has shown that even at very early stages of development, language and perception are linked. In the solution of nonverbal tasks, even if a problem is solved without a sound being uttered, language plays a role in the outcome. These findings substantiate the thesis of psychological linguistics as formulated many years ago by A. Potebnya, who argued for the inevitable interdependence between human thought and language.[2]

A special feature of human perception—which arises at a very young age—is the *perception of real objects.* This is something for which there is no analogy in animal perception. By this term I mean that I do not see the world simply in color and shape but also as a world with sense and meaning. I do not merely see something round and black with two hands; I see a clock and I can distinguish one hand from the other. Some brain-injured patients say, when they see a clock, that they are seeing something round and white with two thin steel strips, but they do not know it is a clock; such people have lost their real relationship with objects. These observations suggest that all human perception consists of categorized rather than isolated perceptions.

The developmental transition to qualitatively new forms of behavior is not confined to changes in perception alone. Perception is part of a dynamic system of behavior; hence, the relation between transformations of perceptual processes and transformations in other intellectual activities is of primary importance. This point is illustrated by our studies on choice behavior, which show the changing relation between perception and motor action in young children.

STUDIES OF CHOICE BEHAVIOR IN CHILDREN

We requested four- and five-year-old children to press one of five keys on a keyboard as they identified each one of a series of picture stimuli assigned to each key. Because this task exceeds the capabilities

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

of the children, it causes serious difficulties and more intensive efforts to solve the problem. Perhaps the most remarkable result is that the entire process of selection by the child is *external,* and concentrated in the motor sphere, thus allowing the experimenter to observe the very nature of the choice process itself in the child's movements. The child does her selecting while carrying out whatever movements the choice requires.

The structure of the child's decision does not in the least resemble the adult process. Adults make a preliminary decision internally and subsequently carry out the choice in the form of a single movement that executes the plan. The child's choice resembles a somewhat delayed *selection among his own movements.* Vascillations in perception are directly reflected in the structure of movement. The child's movements are replete with diffuse gropings that interrupt and succeed one another. A mere glance at the chart tracing the child's movements is sufficient to convince one of the basic motor nature of the process.

The main difference between the choice processes in the child and in the adult is that for the child the series of tentative movements constitute the selection process. The child does not choose the *stimulus* (the necessary key) as the starting point for the consequent movement but rather selects the *movement,* using the instruction as a guide to check the results. Thus, the child resolves her choice not through a direct process of visual perception but through movement, hesitating between two stimuli, her fingers hovering above and moving from one key to another, going half-way and then coming back. When the child transfers her attention to a new location, thereby creating a new focus in the dynamic structure of perception, her hand obediently moves toward this new center, in unison with the eye. In short, movement is not separated from perception: the processes coincide almost exactly.

In the behavior of the higher animals, visual perception forms part of a more complex whole in a similar way. The ape does not perceive the visual situation passively; a complex behavioral structure consisting of reflexive, affective, motor, and intellectual factors is directed toward acquiring the object that attracts it. The ape's movements constitute an immediate dynamic continuation of its perception. In human children, this early, diffusely structured response undergoes a fundamental change as soon as a more complex psychological function is utilized in the choice process. The natural process present in animals is then transformed into a higher psychological operation.

Subsequent to the experiment described above we attempted to simplify the task of selection by marking each key with a corresponding

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

sign to serve as an additional stimulus that could direct and organize the choice process. The child was asked, upon the appearance of a target stimulus, to press the key marked with the corresponding sign. As early as age five or six the child is able to fulfill this task easily. The addition of this new ingredient radically changes the structure of the choice process. The elementary, "natural" operation is replaced by a new and more complicated one. The simpler task evokes a more complexly structured response. When the child attends to the auxiliary sign in order to find the key corresponding to the given stimulus, he no longer exhibits those motor impulses that arise directly from perception. There are no uncertain groping movements in the air such as we observed in the earlier choice reaction when auxiliary aids were not used.

The use of auxiliary signs breaks up the fusion of the sensory field and the motor system and thus makes new kinds of behavior possible. A "functional barrier" is created between the initial and final moments of the choice response; the direct impulse to move is shunted by preliminary circuits. The child who formerly solved the problem impulsively now solves it through an internally established connection between the stimulus and the corresponding auxiliary sign. The movement that previously had been the choice now serves only to fulfill the prepared operation. *The system of signs restructures the whole psychological process and enables the child to master her movement. It reconstructs the choice process on a totally new basis.* Movement detaches itself from direct perception and comes under the control of sign functions included in the choice response. This development represents a fundamental break with the natural history of behavior and initiates the transition from the primitive behavior of animals to the higher intellectual activities of humans.

Attention should be given first place among the major functions in the psychological structure underlying the use of tools. Beginning with Köhler, scholars have noted that the ability or inability to direct one's attention is an essential determinant of the success or failure of any practical operation. However, the difference between the practical intelligence of children and animals is that children are capable of reconstructing their perception and thus freeing themselves from the given structure of the field. With the help of the indicative function of words, the child begins to master his attention, creating new structural centers in the perceived situation. As K. Koffka so aptly put it, the child is able to determine for herself the "center of gravity" of her perceptual field; her behavior is not regulated solely by the salience of individual ele-

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

ments within it. The child evaluates the relative importance of these elements, singling out new "figures" from the background and thus widening the possibilities for controlling her activities.[3]

In addition to reorganizing the visual-spatial field, the child, with the help of speech, creates a time field that is just as perceptible and real to him as the visual one. The speaking child has the ability to direct his attention in a dynamic way. He can view changes in his immediate situation from the point of view of past activities, and he can act in the present from the viewpoint of the future.

For the ape, the task is unsolvable unless the goal and the object needed to reach it are both simultaneously in view. For the child, this gap is easily overcome by verbally controlling her attention and thereby reorganizing her perceptual field. The ape will perceive a stick one moment, but cease to pay attention to it after its visual field has changed and the goal comes into view. The ape must see his stick in order to pay attention to it; the child may pay attention in order to see.

Thus, the child's field of attention embraces not one but a whole series of potential perceptual fields that form successive, dynamic structures over time. The transition from the simultaneous structure of the visual field to the successive structure of the dynamic field of attention is achieved through the reconstruction of the separate activities that are a part of the required operations. When this occurs, we can say that the field of attention has detached itself from the perceptual field and unfolded itself in time, as one component of a dynamic series of psychological activities.

The possibility of combining elements of the past and present visual fields (for instance, tool and goal) in one field of attention leads in turn to a basic reconstruction of another vital function, *memory*. (See chapter 3.) Through verbal formulations of past situations and activities, the child frees himself from the limitations of direct recall; he succeeds in synthesizing the past and present to suit his purposes. The changes that occur in memory are similar to those that occur in the child's perceptual field where centers of gravity are shifted and figure and ground relationship are altered. The child's memory not only makes fragments of the past more available, but also results in a *new method of uniting the elements of past experience with the present.*

Created with the help of speech, the time field for action extends both forward and backward. Future activity that can be included in an ongoing activity is represented by signs. As in the case of memory and attention, the inclusion of signs in temporal perception does not lead to a simple lengthening of the operation in time; rather, it creates the

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.

conditions for the development of a single system that includes effective elements of the past, present, and future. This emerging psychological system in the child now encompasses two new functions: *intentions and symbolic representations of purposeful action.*

This change in the structure of the child's behavior is related to basic alterations in the child's needs and motivations. When Lindner compared the methods by which deaf children solved tasks to the methods used by Köhler's ape, he noted that the motives guiding the ape and those guiding the child to achieve mastery of a goal were not the same.[4] The "instinctive" urges predominating in the animal become secondary in the child. New motives, socially rooted and intense, provide the child with direction. K. Lewin described these motives as *Quasi-Beduerfnisse* (quasi-needs) and argued that their inclusion in any given task leads to the reorganization of the child's whole affective and voluntary system.[5] He believed that with the development of these quasi-needs, the child's emotional thrust is shifted *from a preoccupation with the outcome* to *the nature of the solution.* In essence, the "task" *(Aufgabe)* in experiments with apes exists only in the eyes of the experimenter; as far as the animal is concerned there exists only the bait and the obstacles standing in his way. The child, however, strives to solve the given problem and thus has an entirely different purpose. Because he is able to form quasi-needs, the child is capable of breaking the operation into its separate parts, each of which becomes an independent problem that he formulates for himself with the help of speech.

In his excellent analysis of the psychology of purposeful activity, Lewin gives a clear-cut definition of voluntary activity as a product of the historical-cultural development of behavior and as a unique feature of human psychology. The fact that man displays extraordinary freedom with respect to even the most senseless intention is astounding in itself, he asserts. This freedom is incomparably less characteristic of children and probably of nonliterate humans, too. There is reason to believe that voluntary activity, more than highly developed intellect, distinguishes humans from the animals which stand closest to them.

Copyright © 1978. Harvard University Press. All rights reserved.

Vygotsky, L. S. (1978). Mind in society : Development of higher psychological processes. Harvard University Press.
Created from gcu on 2024-09-18 10:06:26.